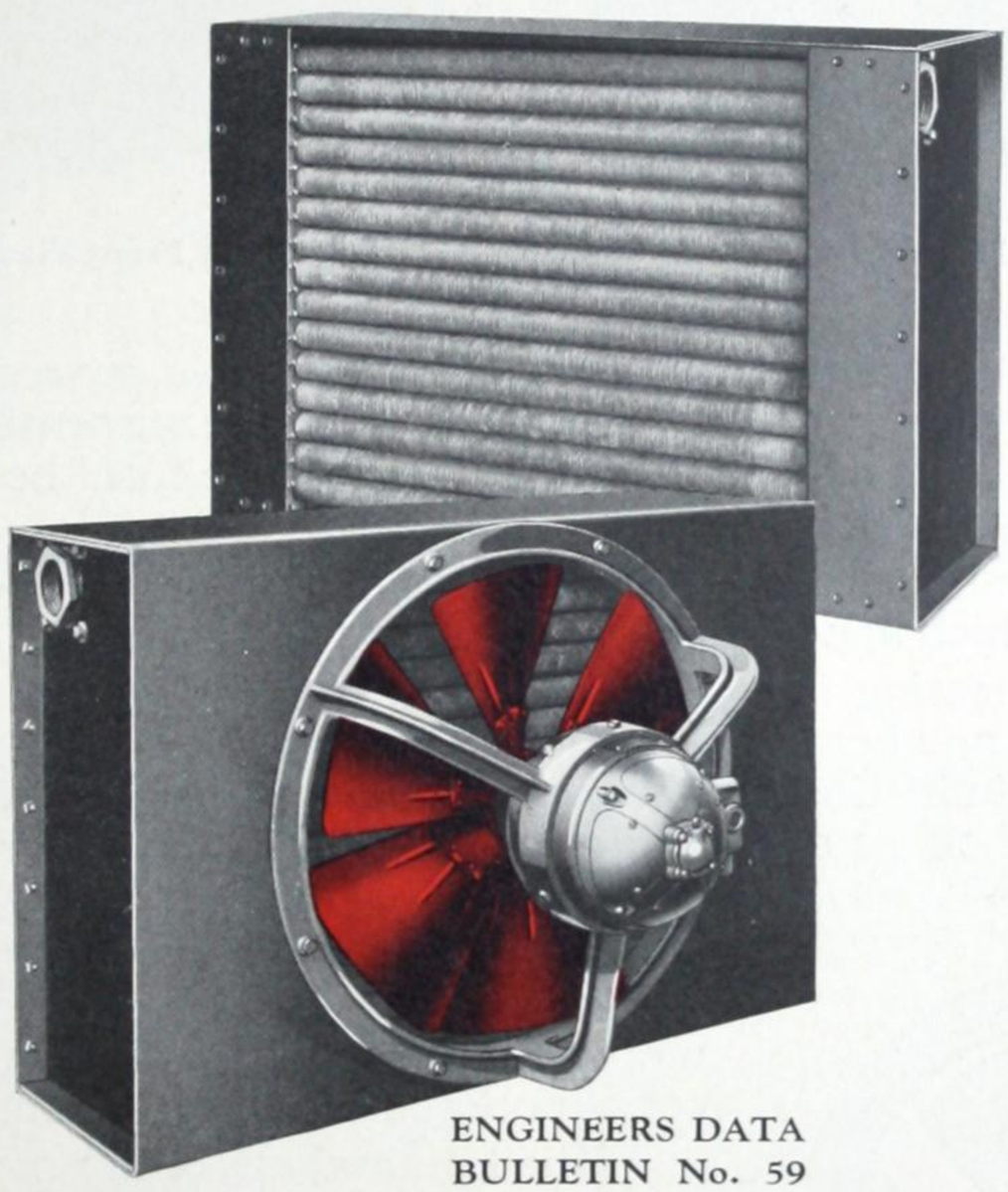
A. I. A. FILE No. 30 D11

MASSACHUSETTS

UNIT HEATERS

TYPE "H"

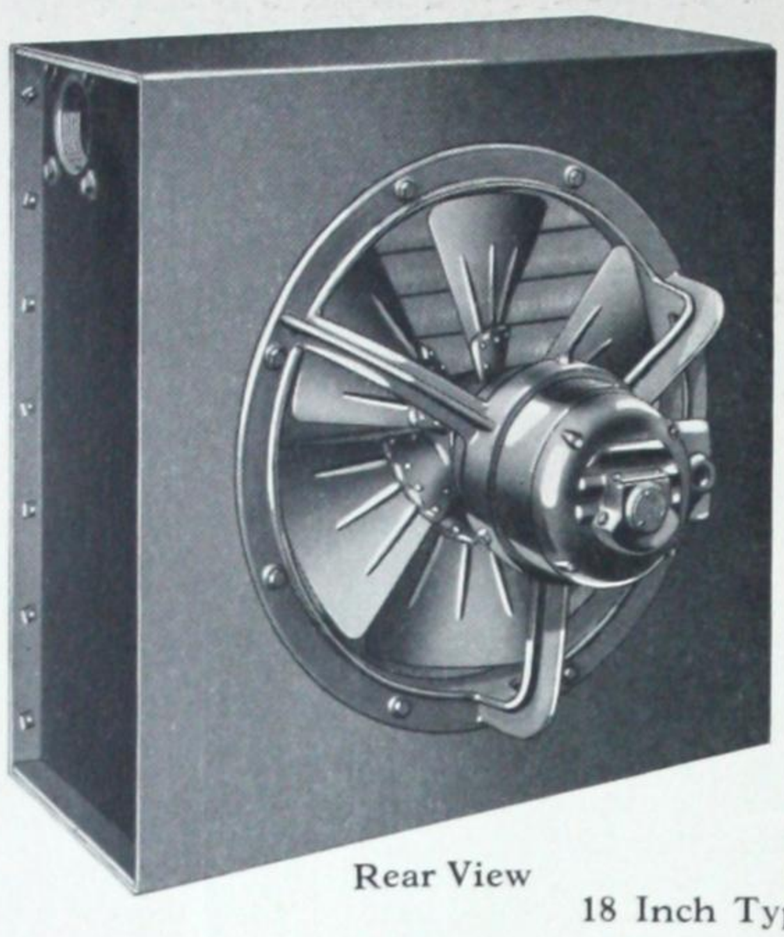


ENGINEERS DATA
BULLETIN No. 59

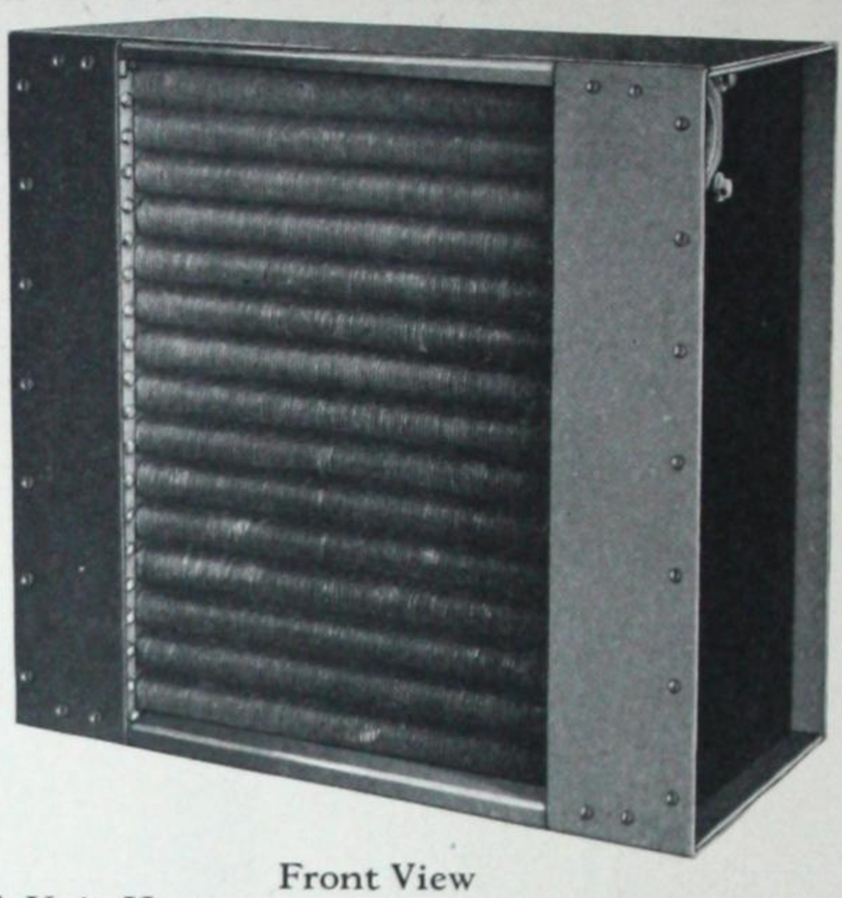
MASSACHUSETTS BLOWER DIVISION
of
THE BISHOP & BABCOCK SALES CO.
General Offices - 4901 - 4915 Hamilton Ave. N.E.
CLEVELAND, OHIO.

A. I. A. FILE No. 30 D11

Massachusetts Type "H" Unit Heaters



Rear View



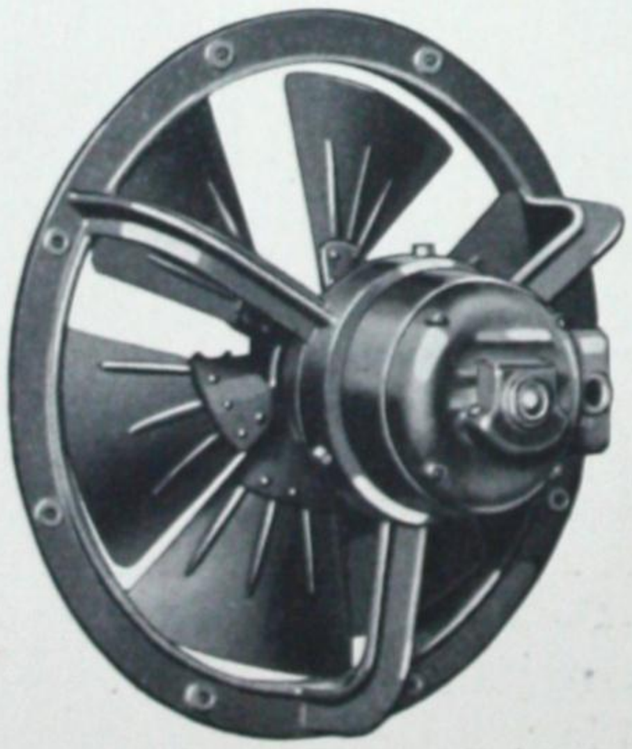
Front View

18 Inch Type "H" Unit Heater

For installations where floor space is not available, we recommend Massachusetts Type H Unit Heaters, arranged for ceiling suspension. These units are built in three sizes 18", 24" and 30" and can be furnished with deflectors and recirculating boxes if required.

Numerous innovations in design and performance have been incorporated in these units which appeal to the engineering fraternity.

The heater casing is so designed that an air space or plenum is made between the fan and heater section insuring a uniform velocity over the entire heater surface eliminating high velocity points and dead pockets usually found in units where the fans are set directly against the heating medium.



Fan and Motor Assembly

The Propeller Fans used in all Massachusetts Type H Unit Heaters represent a design recognized for its ability to produce larger and more uniform air displacement with less power consumption and quieter operation.

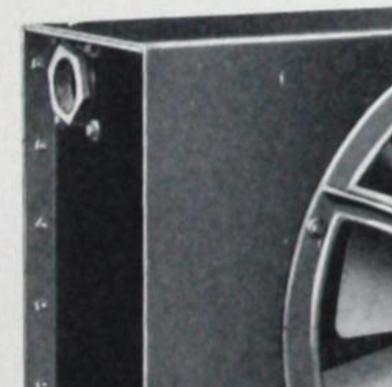
The Fan and motor are mounted in a rigid tripod of close grain grey iron which in turn is securely bolted to the heater casing.

Motors furnished are totally enclosed, automatically lubricated ball bearings, and are sufficiently large to run continuously under any conditions without ventilation, insuring against dust and fumes of factory processes entering and injuring the motor. With single phase alternating current units, condenser type motors are furnished insuring quiet operation and efficiency not to be found in the Repulsion-Induc-

tion and Split Phase types of motors. Three speed switches can be furnished with condenser motors when desired.

Heating Coils:

The heating elements used in all Massachusetts Type H Unit Heaters are high pressure B & B Copper Fin Radiation, and are furnished two and three tubes deep and in one or two sections depending on the size of the heater and the requirements of the particular installation.



B & B Heating Coil

The heater consists of ¾" copper tubes, each tube is wrapped with a thin copper radial fin 1½" outside diameter. These fins which are tinned to the tubes to insure a perfect bond, are of proper width to give maximum heat transfer with a minimum tube spacing, and the spacing of the fins are such as to give a maximum surface without undue air resistance.

The tubes are mounted between heavy brass tube sheets and fused into holes in these sheets to insure leak-proof joints under all operating conditions.

The headers are of close grain cast iron; the return header having an eccentric tapping to prevent accumulation of condensate in the heater section.

The heater sections are designed to operate on steam pressures up to 125 pounds per square inch, and each section is subjected to a 250 pound per square inch hydrostatic test before being assembled into the casing.

Rear View

Front View

24 Inch Type H Unit Heater

The heater casings, both inside and out, are finished in two coats of high grade olive green lacquer. The fan wheels are given two coats of special paint of contrasting color, which resists the wearing action of the air passing through the fan.

The performance and efficiency of Massachusetts Type H Unit Heaters can be increased when installed in conjunction with Recirculating boxes by means of which it is possible to more nearly approach the highly efficient performance of the Type V or floor mounted units.

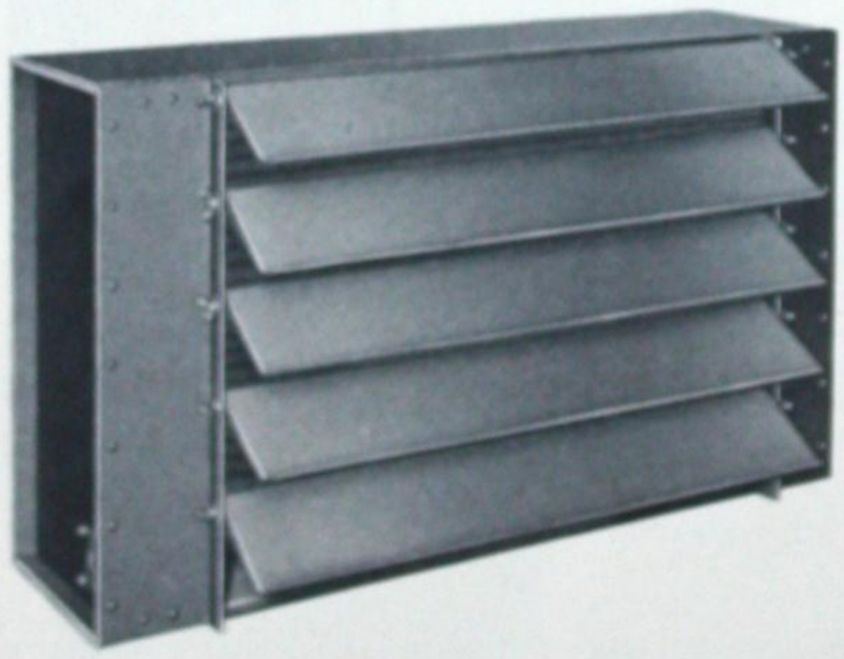
With recirculating boxes the cool strata of air is taken from a point just above the floor level, drawn up through the vertical recirculating box and discharged above the breathing zone in a horizontal plane. This insures uniform, efficient heating, and prevents overheating in the upper areas.

The use of recirculating boxes is especially desirable where there is considerable height to the building to be heated as there is a much smaller difference between temperatures at the ceiling and floor when this method is used.

Massachusetts recirculating boxes are constructed of heavy blue annealed steel sheets reinforced with a frame of angle iron. They are equipped with doors fitted with latches and hinges which permits inspection of the motor.

Type H Unit Heater
Floor type with recirculating box

Massachusetts Type H Unit Heaters can be arranged for ventilating as well as heating by means of a fresh air intake box fitted with dampers allowing any portion of the air to be recirculated or drawn from out of doors as desired.



Type H Unit Heater with Louvre Deflectors

Where the use of a recirculating box is precluded due to lack of floor space, and the units must be hung high above the floor, deflectors are often used to direct the air downward. Adjustable louvre deflectors, which may be regulated as to the angle of discharge, can be had for all Type H Unit Heaters.

Large mesh grilles of heavy wire, which cover the entire face of the heater, protecting the tubes of the heating element from damage, can be furnished when desired.

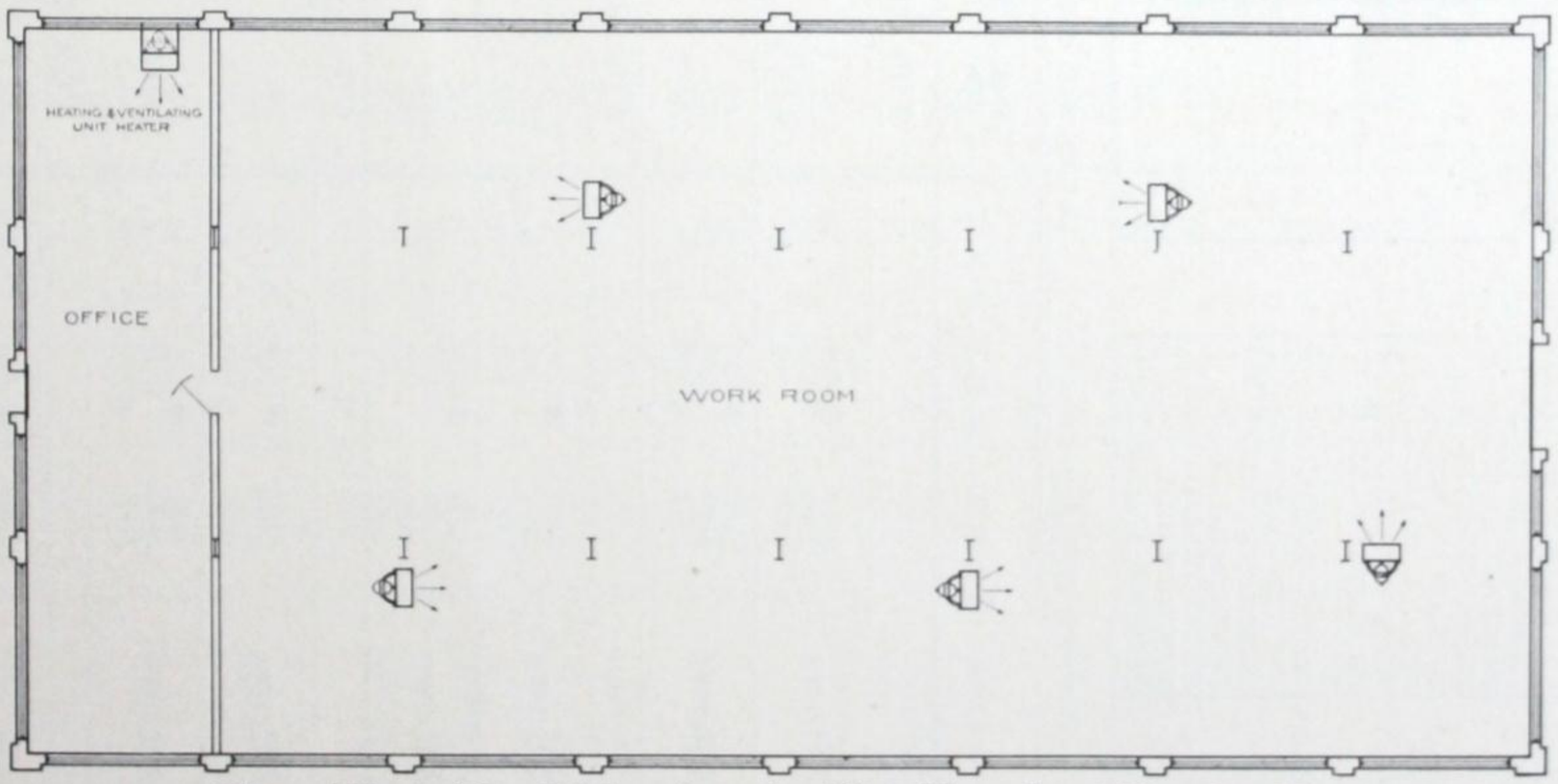
MASSACHUSETTS

Rear View

Front View

30 Inch Type H Unit Heater

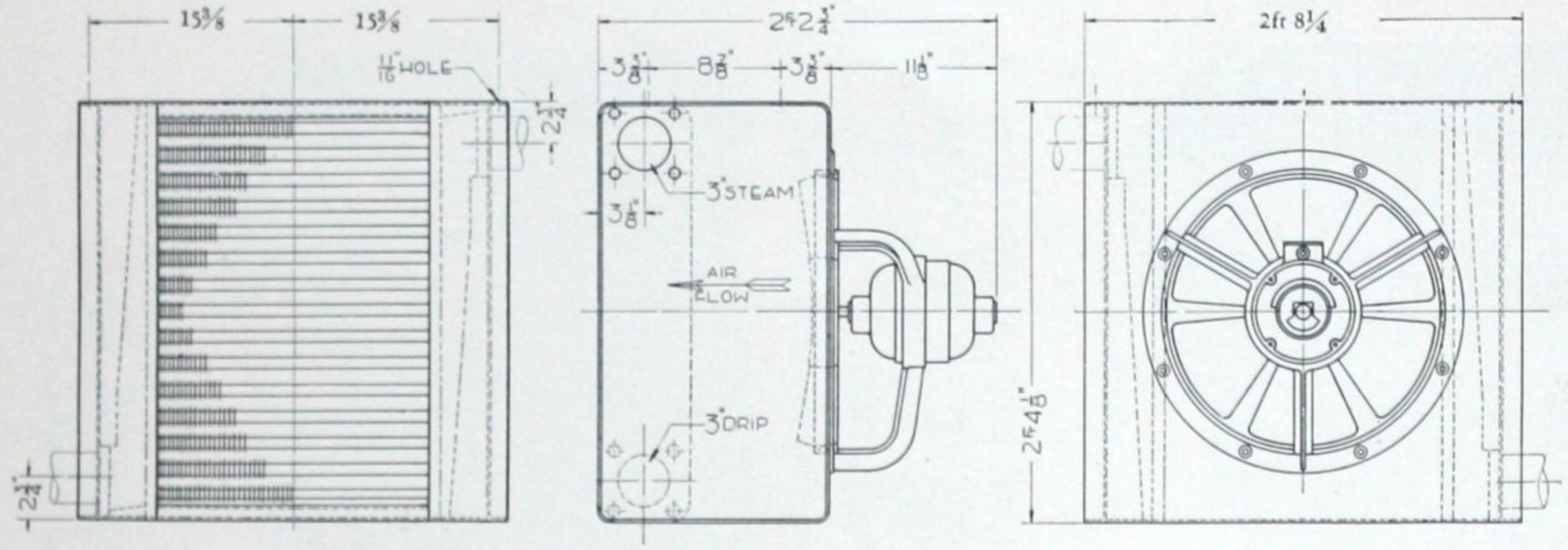
The location of unit heaters plays such an important part in the efficient performance and results obtained that every consideration should be given this feature. Bishop & Babcock Engineers are available for laying out the unit heating system; this service without charge or obligation.



Plan of Typical Small Manufacturing Plant Heated and Ventilated by Massachusetts Type "H" Unit Heater

The B&B Line

No. 18 MASSACHUSETTS TYPE "H" UNIT HEATERS



DISCHARGE SIDE ELEVATION — RETURN END ELEVATION — INLET SIDE ELEVATION

SPECIFICATIONS

FAN:—18" Design 5 Massachusetts Electric Propeller Fan.

MOTOR:—Totally enclosed round frame, ball bearing motor. Single phase units furnished with condenser type motors.

HEATER:—No. 22 High Pressure B. & B. Heater Sections—¾" copper tubes and 1½" copper fins, all tinned, the former welded into drilled holes in the brass tube sheets. Headers of close grained cast iron.

All heaters are designed for 125 pounds steam working pressure, and are tested at 250 pounds hydrostatic pressure.

Linear feet of tubing:—2-Row—53 feet;
3-Row—81 feet.

Entering Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
	Number of tubes deep				0 lbs. Steam Pressure—212°F				10 lbs. Steam Pressure—240°F				75 lbs. Steam Pressure—320°F			
70°F	2 Rows	3440	●1750	¼	105	125620	129.5	525	111.5	149460	157	625	130	215900	241.5	899
		2260	1150	⅙	110.5	96520	99.5	403	118.5	114720	120.5	480	141	165840	185.5	690
		1690	860	1/10	115	80510	83	333	124	95200	100	398	149	137680	154	572
	3 Rows	3200	●1750	¼	120	166840	172	695	124	198020	208	826	157.5	286530	320.5	1190
		2100	1150	⅙	128	126100	130	526	139.5	149940	157.5	627	172	216350	242	900
		1570	860	1/10	133	101850	105	425	145.5	121380	127.5	509	182	175220	196	730
					5 lbs. Steam Pressure—227°F				25 lbs. Steam Pressure—267°F				125 lbs. Steam Pressure—353°F			
	2 Rows	3440	●1750	¼	108	138240	144	576	118	172140	184.5	719	137.5	239570	276	1000
		2260	1150	⅙	115	106560	111	444	126.5	132490	142	552	149.5	184020	212	769
		1690	860	1/10	120	88320	92	368	133	122880	117.5	457	158.5	152770	176	636
	3 Rows	3200	●1750	¼	125	183840	191.5	765	139	228590	245	955	168.5	318120	366.5	1328
		2100	1150	⅙	134	139200	145	580	150.5	172610	185	721	185	240440	277	1007
		1570	860	1/10	139.5	112320	117	469	158	139950	150	584	195	194870	224.5	811
60°F					0 lbs. Steam Pressure—212°F				10 lbs. Steam Pressure—240°F				75 lbs. Steam Pressure—320°F			
	2 Rows	3440	●1750	¼	97	136770	141	571	104	161360	169.5	673	123.5	229310	256.5	954
		2260	1150	⅙	103	104760	108	448	111.5	123760	130	516	134.5	176120	197	733
		1690	860	1/10	108.5	86820	89.5	363	117	102340	107.5	428	144	146170	163.5	606
	3 Rows	3200	●1750	¼	113	180910	186.5	755	123.5	213250	224	890	151.5	303070	339	1261
		2100	1150	⅙	122.5	137260	141.5	573	134	161840	170	676	168	230650	258	956
		1570	860	1/10	127.5	111070	114.5	464	140.5	131380	138	546	177.5	185950	208	775
					5 lbs. Steam Pressure—227°F				25 lbs. Steam Pressure—267°F				125 lbs. Steam Pressure—353°F			
	2 Rows	3440	●1750	¼	101	150240	156.5	625	110.5	184730	198	770	130	253460	292	1058
		2260	1150	⅙	108	115200	120	481	119	141820	152	592	143	194430	224	812
		1690	860	1/10	113.5	95520	99.5	398	126	117090	125.5	489	152.5	161450	186	673
	3 Rows	3200	●1750	¼	119	198720	207	828	133	244450	262	1017	162.5	335920	387	1400
		2100	1150	⅙	128.5	150720	157	629	145	185210	198.5	774	179.5	254760	293.5	1061
		1570	860	1/10	134.5	121920	127	510	152.5	149750	160.5	625	191	206580	238	860

No. 18 Massachusetts Type "H" Unit Heaters—Continued

Entering Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
50 °F	Number of tubes deep				0 lbs. Steam Pressure—212 °F				10 lbs. Steam Pressure—240 °F				75 lbs. Steam Pressure—320 °F			
	2 Rows	3440	●1750	¼	89	147930	152.5	616	97	171840	180.5	716	115	241380	270	1003
		2260	1150	⅙	96.5	113490	117	473	104	131850	138.5	550	127	185060	207	770
		1690	860	⅒	102	94090	97	392	110.5	109480	115	457	136.5	153770	172	640
	3 Rows	3200	●1750	¼	107.5	195940	202	819	117	228480	240	952	146	320500	358.5	1333
		2100	1150	⅙	117	148900	153.5	620	128	172790	181.5	721	162	242720	271.5	1005
		1570	860	⅒	122.5	120280	124	501	134.5	139940	147	584	172.5	197570	221	820
					5 lbs. Steam Pressure—227 °F				25 lbs. Steam Pressure—267 °F				125 lbs. Steam Pressure—353 °F			
	2 Rows	3440	●1750	¼	93.5	161280	168	671	102.5	195930	210	816	123	265610	306	1106
		2260	1150	⅙	101	123840	129	515	112.5	150210	161	626	136	203980	235	850
		1690	860	⅒	106	102720	107	427	120	125020	134	521	145.5	169260	195	706
	3 Rows	3200	●1750	¼	112.5	214080	223	897	127	260310	279	1086	157	352840	406.5	1472
		2100	1150	⅙	123	162240	169	675	139.5	197330	211.5	824	175	267340	308	1113
		1570	860	⅒	129.5	131520	137	548	147	160000	171.5	666	186	216570	249.5	903
30 °F					0 lbs. Steam Pressure—212 °F				10 lbs. Steam Pressure—240 °F				75 lbs. Steam Pressure—320 °F			
	2 Rows	3440	●1750	¼	74	170720	176	712	81	194210	204	810	100	265070	296.5	1103
		2260	1150	⅙	82	131440	135.5	549	90	149460	157	623	112.5	204730	229	850
		1690	860	⅒	88.5	108640	112	454	97	123760	130	515	122.5	169000	189	705
	3 Rows	3200	●1750	¼	94.5	226980	234	948	104	258470	271.5	1079	132.5	352240	394	1469
		2100	1150	⅙	105	171690	177	717	116.5	195160	205	815	150	267310	299	1113
		1570	860	⅒	112.5	140170	144.5	585	124.5	159460	167.5	664	162.5	218140	244	905
					5 lbs. Steam Pressure—227 °F				25 lbs. Steam Pressure—267 °F				125 lbs. Steam Pressure—353 °F			
	2 Rows	3440	●1750	¼	78.5	184320	192	769	88.5	218790	234.5	914	107	290350	334.5	1208
		2260	1150	⅙	86.5	142080	148	591	98	168410	180.5	703	121.5	223940	258	941
		1690	860	⅒	93	117600	122.5	489	105.5	139480	149.5	581	132.5	185320	213.5	783
	3 Rows	3200	●1750	¼	99.5	244800	255	1020	114	291100	312	1212	143	386260	445	1610
		2100	1150	⅙	111	185280	193	773	128	220190	236	921	162.5	291650	336	1214
		1570	860	⅒	119	151200	157.5	628	138	179600	192.5	750	176.5	237830	274	992
0 °F					0 lbs. Steam Pressure—212 °F				10 lbs. Steam Pressure—240 °F				75 lbs. Steam Pressure—320 °F			
	2 Rows	3440	●1750	¼	50	204670	211	855	56	226580	238	942	75	295020	330	1230
		2260	1150	⅙	60	158110	163	658	67	174220	183	726	88.5	227520	254.5	945
		1690	860	⅒	66.5	130470	134.5	544	74	143750	151	600	98	188190	210.5	783
	3 Rows	3200	●1750	¼	74.5	273060	281.5	1132	82.5	300830	316	1250	109.5	392910	439.5	1633
		2100	1150	⅙	86.5	205640	212	860	96	226580	238	946	128.5	296810	332	1237
		1570	860	⅒	95	168300	173.5	702	105.5	186120	195.5	776	141.5	243170	272	1011
					5 lbs. Steam Pressure—212 °F				25 lbs. Steam Pressure—267 °F				125 lbs. Steam Pressure—353 °F			
	2 Rows	3440	●1750	¼	54.5	218880	228	911	63	250980	269	1047	81	317690	366	1328
		2260	1150	⅙	64.5	168480	175.5	700	74.5	193130	207	807	96	244780	282	1020
		1690	860	⅒	71.5	139200	145	579	83	160000	171.5	666	107	202240	233	845
	3 Rows	3200	●1750	¼	79	289920	302	1208	92	333080	357	1391	119	421850	486	1760
		2100	1150	⅙	92.5	219840	229	916	107	251910	270	1050	138.5	319420	368	1335
		1570	860	⅒	102	180000	187.5	747	119	206660	221.5	863	154	261700	301.5	1091

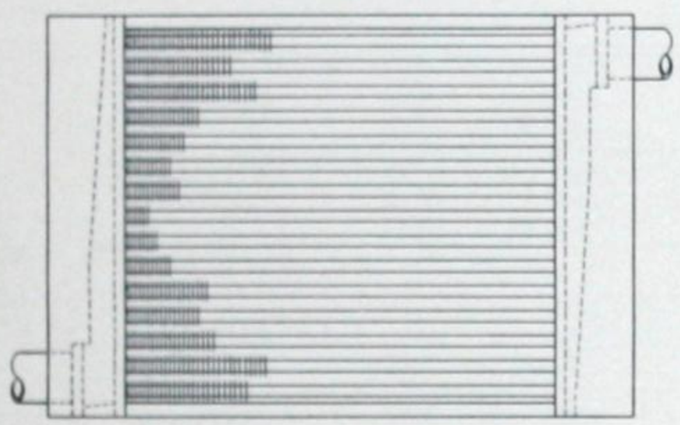
C. F. M.—The cubic feet of air per minute rating in the above tables represents the total quantity of air handled by the fans at the entering air temperature.

R. P. M. The speeds shown correspond to full load R. P. M. of commercial direct current and 60 cycle alternating current motors.

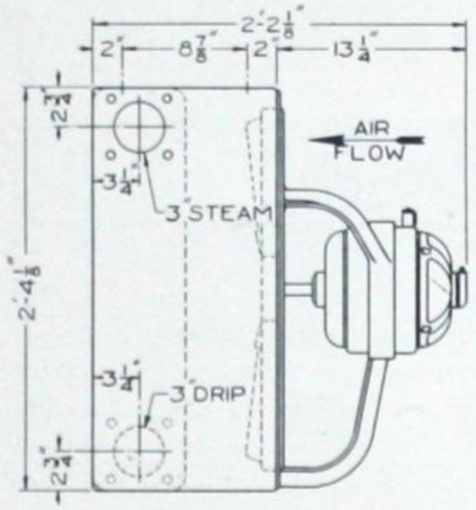
●The 1750 R. P. M. units should not be used on installations where practically silent operation is required.

EQUIVALENT RADIATION—The equivalent square foot of direct cast iron column radiator is based on a heat emission of 240 B. T. U. per hour per foot square of direct radiation.

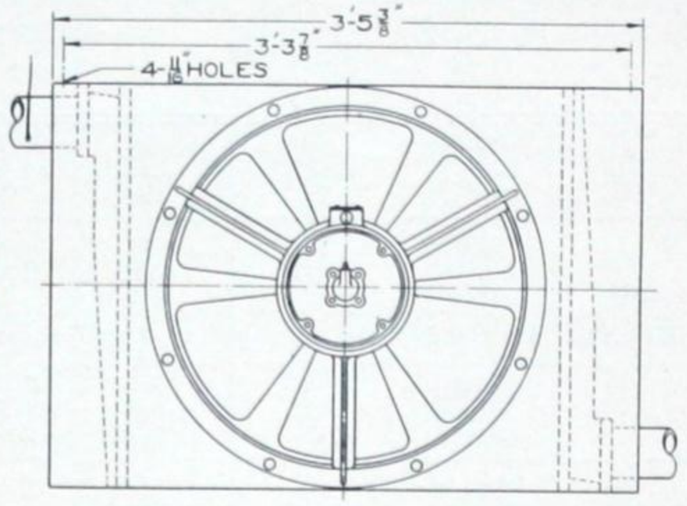
No. 24 MASSACHUSETTS TYPE "H" UNIT HEATERS



DISCHARGE SIDE ELEVATION



RETURN END ELEVATION



INLET SIDE ELEVATION

SPECIFICATIONS

FAN:—24" Design 5 Massachusetts Electric Propeller Fan.

MOTOR:—Totally enclosed, round frame, ball bearing motors. Single phase units furnished with condenser type motors.

HEATER:—No. 31 High Pressure B. & B. Heater Sections—¾" copper tubes and 1½" copper fins, all tinned; the former welded into drilled holes in the brass tube sheets. Headers of close grained cast iron.

All heaters are designed for 125 pounds steam working pressure, and are tested at 250 pounds hydrostatic pressure.

Linear feet of tubing:—2-row—75 feet;
3-row—114 feet.

Entering Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
	Number of tubes deep				0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
70°F.	2 Rows	4950 3650	●1150 860	½ ⅓	102.5 106.5	170470 141770	176 146	710 590	109 114	203210 169000	213.5 177.5	846 705	127 134.5	292590 243330	327 272	1220 1012
	3 Rows	4200 3100	●1150 860	½ ⅓	119.5 125	217440 178300	224 184	906 744	129.5 136	259200 212540	272 223	1080 886	157.5 168	373200 306020	417 342	1555 1275
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	106 110.5	188160 156480	196 163	785 652	115 121	234250 194820	251 209	975 813	133.5 142	325520 270710	375 312	1357 1127
	3 Rows	4200 3100	●1150 860	½ ⅓	125 131	240000 196800	250 205	1000 820	139 147	298800 245020	320.5 262.5	1248 1020	168 180	415200 340460	478.5 392	1730 1418
60°F.					0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	95 99.5	185610 153650	191.5 158.5	773 640	101 106.5	218780 181120	229.5 190	913 755	119.5 127.5	310370 256930	347 287	1292 1070
	3 Rows	4200 3100	●1150 860	½ ⅓	113.5 119.5	236390 194370	243.5 200.5	986 810	123 130.5	278640 229100	292.5 240.5	1160 955	152 163	395280 325010	442 363.5	1645 1354
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	98.5 103.5	203520 168480	212 175.5	848 702	107.5 113.5	250330 207230	268.5 222	1041 863	126.5 135	343950 284730	396 328	1432 1185
	3 Rows	4200 3100	●1150 860	½ ⅓	118.5 127	259200 213120	270 222	1080 887	132.5 141.5	318820 262140	341.5 281	1330 1090	162.5 182	438050 381480	504.5 439.5	1825 1588

No. 24 Massachusetts Type "H" Unit Heaters—Continued

Entering Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
50°F.	Number of tubes deep				0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	87 92	201150 166380	207.5 171.5	839 693	93.5 99	234280 193780	246 203.5	975 808	112 120	327940 271250	366.5 303	1305 1129
	3 Rows	4200 3100	●1150 860	½ ⅓	107 114	257050 210840	265 217.5	1070 879	117 124.5	299380 245550	314.5 258	1245 1022	145 157	419080 343730	468.5 384	1745 1430
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	91 96	219360 181440	228.5 189	914 756	100 106	267180 220990	286.5 237	1113 921	118.5 127.5	361940 299380	417 345	1508 1245
	3 Rows	4200 3100	●1150 860	½ ⅓	112.5 120	280320 229920	292 239.5	1169 958	127 136.5	341430 280040	366 300	1421 1166	156.5 170	462530 379370	533 437	1925 1580
30°F.					0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	72 77	232520 191540	239.5 197.5	969 796	78 84	264340 217750	277.5 228.5	1100 906	96 104.5	360050 296600	402.5 331.5	1500 1233
	3 Rows	4200 3100	●1150 860	½ ⅓	94.5 102	296220 244100	305.5 251.5	1235 1016	103.5 113	336760 277510	353.5 291.5	1402 1156	132 145.5	458690 378000	513 422.5	1905 1575
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	75.5 81	250560 206400	261 215	1042 860	85 91	298170 245620	319.5 263	1242 1022	103 110.5	393380 324050	453 373	1638 1350
	3 Rows	4200 3100	●1150 860	½ ⅓	100 107	319200 263040	332.5 274	1330 1095	113 124	379850 313020	407 335.5	1582 1304	142.5 156.5	501140 412970	577.5 475.5	2090 1720
0°F.					0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	4950 3650	●1150 850	½ ⅓	48.5 54.5	281230 231340	290 238.5	1170 962	54 60	308020 253370	323.5 266	1283 1054	71 79.5	401760 330480	449 369.5	1670 1375
	3 Rows	4200 3100	●1150 860	½ ⅓	74.5 84	358340 294840	369.5 304	1493 1228	82 93	392470 322920	412 339	1635 1346	110 123	511920 421200	572.5 471	2135 1755
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	4950 3650	●1150 860	½ ⅓	51.5 58	297600 244800	310 255	1240 1020	60 67	342240 281520	367 302	1423 1171	76.5 86	433010 356180	499 410.5	1805 1485
	3 Rows	4200 3100	●1150 860	½ ⅓	79.5 89	379200 312000	395 325	1580 1300	92 104	436080 358800	467.5 384.5	1817 1495	118.5 134	551740 453960	635.5 523	2300 1890

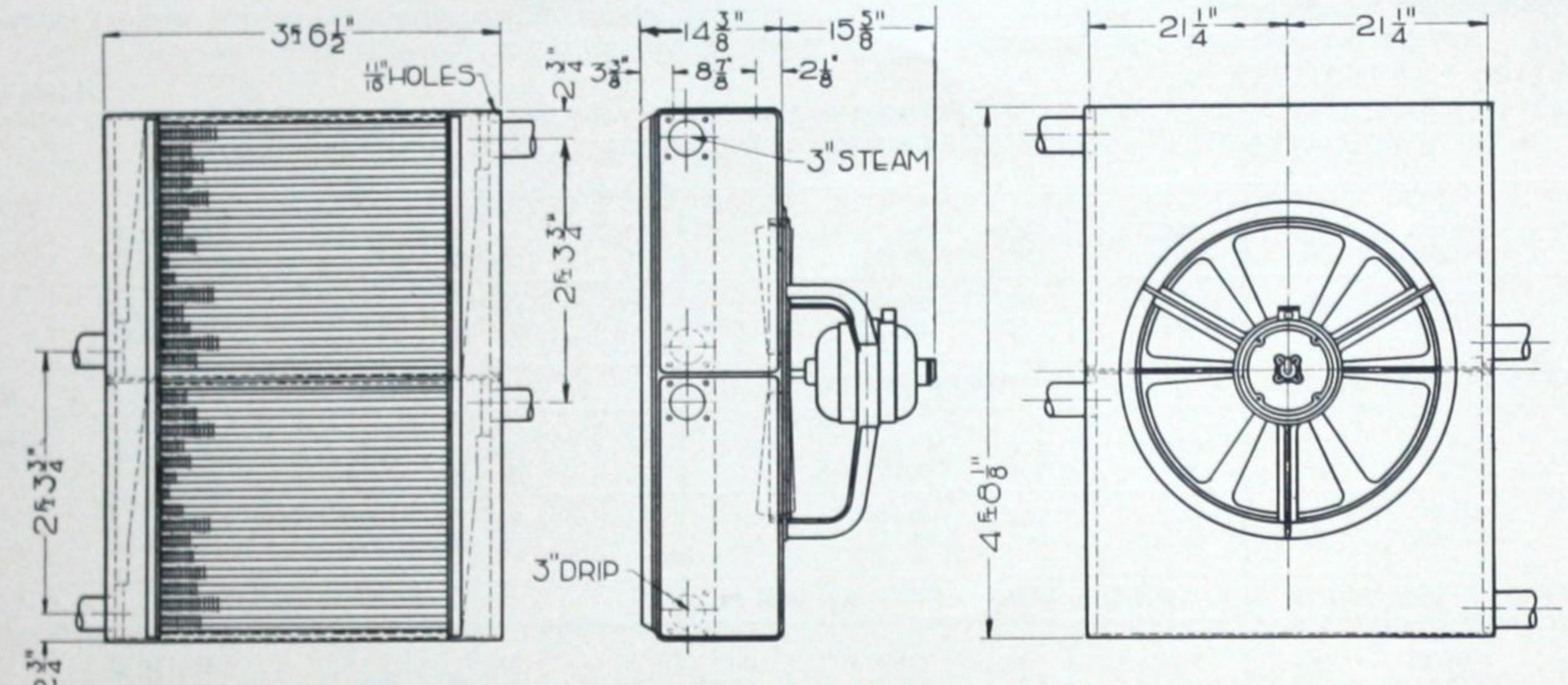
C. F. M.—The cubic feet of air per minute rating in the above tables represents the total quantity of air handled by the fans at the entering air temperature.

R. P. M.—The speeds shown correspond to full load R. P. M. of commercial direct current and 60 cycle alternating current motors.

●The 1150 R. P. M. units should not be used on installations where practically silent operation is required.

EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column radiator is based on a heat emission of 240 B. T. U. per hour per square foot of direct radiation.

No. 30 MASSACHUSETTS TYPE "H" UNIT HEATERS



DISCHARGE SIDE ELEVATION RETURN END ELEVATION INLET SIDE ELEVATION

SPECIFICATIONS

FAN:—30″ design 5 Massachusetts Electric Propeller Fan.

MOTOR:—Totally enclosed, round frame, ball bearing motors. Single Phase units furnished with condenser type motors.

HEATER:—2 sections of No. 37 High Pressure B. & B. Heater Sections—¾″ copper tubes and 1½″ copper fins, all tinned, the former welded into drilled holes in the brass tube sheets. Headers of close grained cast iron.

All heaters are designed for 125 pounds steam working pressure, and are tested at 250 pounds hydrostatic pressure.

Linear feet of tubing:—2 row—180 feet.
3 row—272 feet.

Entering Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
70°F.	Number of tubes deep				0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	6650	690	½	107	259960	268	1082	115	312730	328.5	1300	135	446110	499	1860
		5400	560	¼	110	226980	234	946	118.5	273220	287	1138	140	388890	435	1622
	3 Rows	6100	690	½	123	338530	349	1410	134.5	407460	428	1700	164.5	581100	650	2420
		4950	560	¼	128	297790	307	1238	140.5	358900	377	1495	173	511370	572	2130
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	6650	690	½	111	286560	298.5	1193	121.5	356870	382.5	1488	143	495630	571	2065
		5400	560	¼	114.5	250560	261	1043	125.5	312090	334.5	1300	148.5	434000	500	1810
	3 Rows	6100	690	½	129	373440	389	1555	144.5	465570	499	1945	176	646660	745	2695
		4950	560	¼	133	328800	342.5	1370	150	410050	439.5	1708	186.5	568540	655	2365
60°F.					0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	6650	690	½	100	283730	292.5	1182	107.5	334150	351	1392	128	474270	530.5	1975
		5400	560	¼	102.5	247350	255	1030	110.5	291310	306	1213	133	413920	463	1720
	3 Rows	6100	690	½	117.5	369090	380.5	1538	128	434110	456	1809	158.5	616860	690	2565
		4950	560	¼	122	323980	334	1350	134	380800	400	1585	167.5	541760	606	2255
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	6650	690	½	104	311040	324	1295	114.5	382530	410	1596	135	526000	606	2195
		5400	560	¼	107.5	271200	282.5	1130	121	345210	370	1438	142	458300	528	1910
	3 Rows	6100	690	½	123	404640	421.5	1685	138.5	497290	533	2070	171	684850	789	2850
		4950	560	¼	128.5	355200	370	1480	145.5	437580	469	1822	181	600656	692	2503

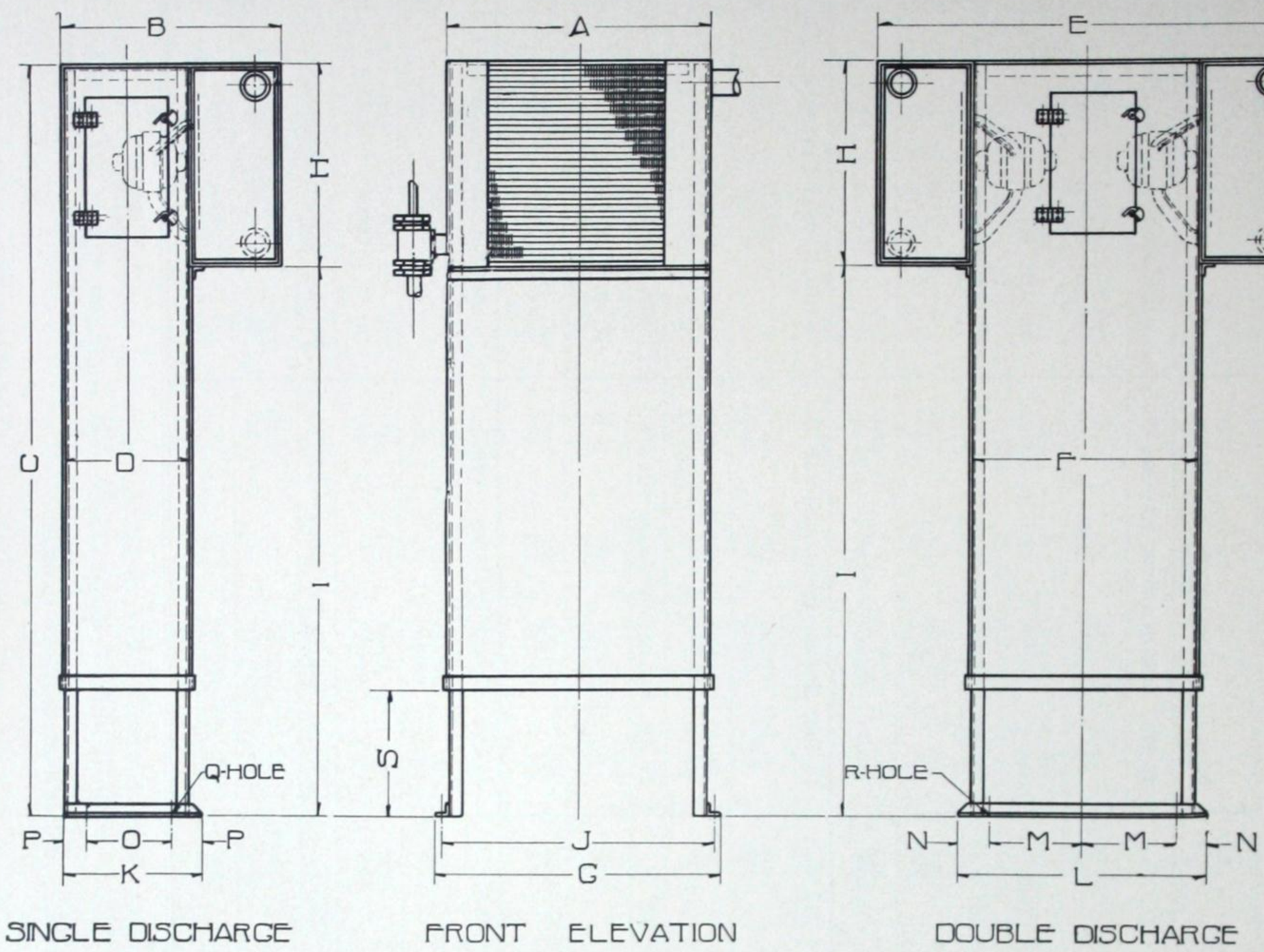
No. 30 Massachusetts Type "H" Unit Heaters—Continued

Entering Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. F°	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
50°F	Number of tubes deep				0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	6650	690	½	92.5	306520	316	1275	99.5	356050	374	1485	120.5	498850	558	2075
		5400	560	¼	96	267720	276	1115	104	311300	327	1295	126.5	436270	488	1815
	3 Rows	6100	690	½	111.5	402550	415	1678	122.5	466960	490.5	1948	154	656200	734	2735
		4950	560	¼	117	352600	363.5	1470	128.5	409360	430	1705	165	581950	641	2420
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	6650	690	½	96.5	333600	347.5	1389	107	405860	435	1690	128	551180	635	2300
		5400	560	¼	100	291840	304	1215	111	354540	380	1475	135	481740	555	2005
	3 Rows	6100	690	½	117.5	438240	456.5	1825	133	532740	571	2220	166	723910	834	3010
		4950	560	¼	123	384000	400	1600	140.5	466500	500	1945	176	633640	730	2638
30°F.					0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	6650	690	½	77.5	352600	363.5	1468	84.5	400790	421	1670	105	546230	611	2275
		5400	560	¼	81.5	309430	319	1289	89	352240	370	1465	112	478290	536	1990
	3 Rows	6100	690	½	100	465600	480	1940	109.5	528360	555	2200	141.5	721460	807	3000
		4950	560	¼	105	403520	416	1680	116	460290	483.5	1920	150	625800	700	2605
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	6650	690	½	81.5	380160	396	1585	92	452510	485	1885	112.5	598050	689	2490
		5400	560	¼	86	333600	347.5	1389	97.5	397460	426	1655	120.5	524270	604	2180
	3 Rows	6100	690	½	105	501120	522	2090	121	597120	640	2490	153	788140	908	3280
		4950	560	¼	111	436320	454.5	1816	127.5	518750	556	2160	161.5	683980	788	2845
0°F.					0 lbs. Steam Pressure—212°F.				10 lbs. Steam Pressure—240°F.				75 lbs. Steam Pressure—320°F.			
	2 Rows	6650	690	½	56.5	436020	449.5	1815	61	467430	491	1947	80	608810	681	2535
		5400	560	¼	61	382180	394	1592	65.5	409840	430.5	1705	87	533720	597	2220
	3 Rows	6100	690	½	83	579090	597	2410	89	621660	653	2590	119	809070	905	3370
		4950	560	¼	87.5	499550	515	2080	95	535980	563	2235	128	697320	780	2900
					5 lbs. Steam Pressure—227°F.				25 lbs. Steam Pressure—267°F.				125 lbs. Steam Pressure—353°F.			
	2 Rows	6650	690	½	58.5	451200	470	1880	68	517820	555	2158	87	656210	756	2735
		5400	560	¼	64	395520	412	1645	73.5	454370	487	1890	95	576350	664	2400
	3 Rows	6100	690	½	87	600000	625	2500	100	689490	739	2870	130.5	876680	1010	3650
		4950	560	¼	92.5	517920	539.5	2155	107	593390	636	2470	139.5	753420	868	3135

C. F. M.—The cubic feet of air per minute rating in the above tables represents the total quantity of air handled by the fans at the entering air temperature.

R. P. M.—The speeds shown correspond to full load R. P. M. of commercial direct current and 60 cycle alternating current motors.

EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column radiator is based on a heat emission of 240 B. T. U. per hour per square foot of direct radiation.



Single and Double Recirculating Boxes For Ceiling Type "H" Unit Heaters

Size	A	B	C	D	E	F	G	H	I	Shipping Weight	
										Single	Double
18	32 1/4	31	106	18	57 3/4	32	34 1/8	28 1/8	77 7/8	365	415
24	41 1/4	31	106	18	57 3/4	32	44 1/8	28 1/8	77 7/8	425	495
30	56 1/4	38 3/8	106	24	68 3/4	40	59 3/4	56 1/8	49 7/8	525	625

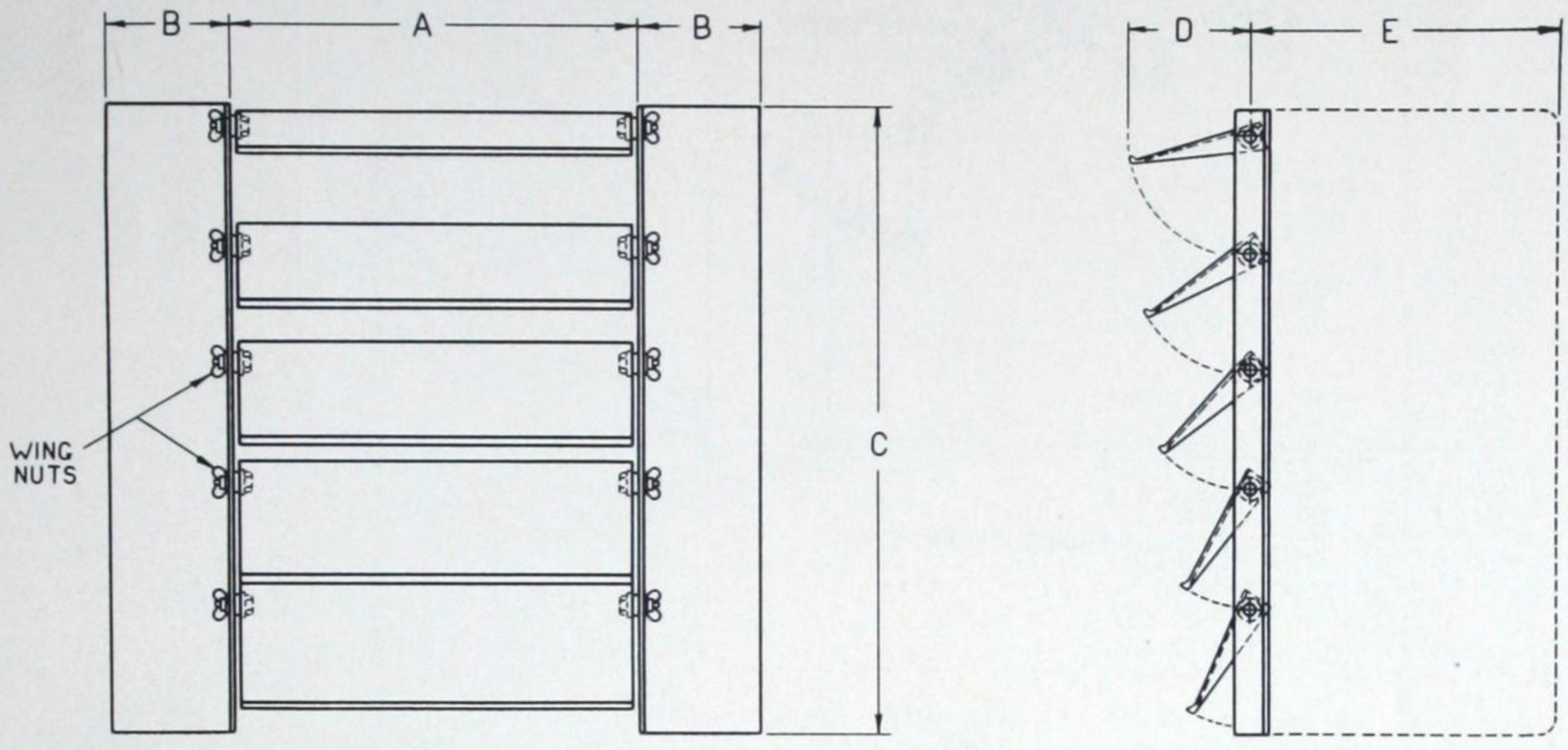
Size	J	K	L	M	N	O	P	Q	R	S	Shipping Weight	
											Single	Double
18	32 1/8	18	32	13	3	13	2 1/2	9/16	9/16	18	365	415
24	41 1/8	18	32	13	3	13	2 1/2	9/16	9/16	18	425	495
30	57 1/4	24	40	17	3	17	3 1/2	9/16	9/16	18	525	625

SPECIFICATIONS

Sides, ends, and top, are of 16 gage blue annealed sheets, spot welded to supporting angle legs extending entire length of unit.

Finished to match unit heater with two coats of high grade lacquer.

Damper for mixing fresh and recirculated air can be furnished with all recirculating boxes when required.



DEFLECTORS FOR TYPE "H" UNIT HEATERS

DEFLECTORS FOR TYPE "H" UNIT HEATERS

Size of Heater	Number of Vanes	Principal Dimensions—Inches				
		A	B	C	D	E
18	5	22	6	28½	6¼	19⅛″
24	5	31	6	28½	6¼	19⅛″
30	10	37	6	56⅜	6¼	19⅛″

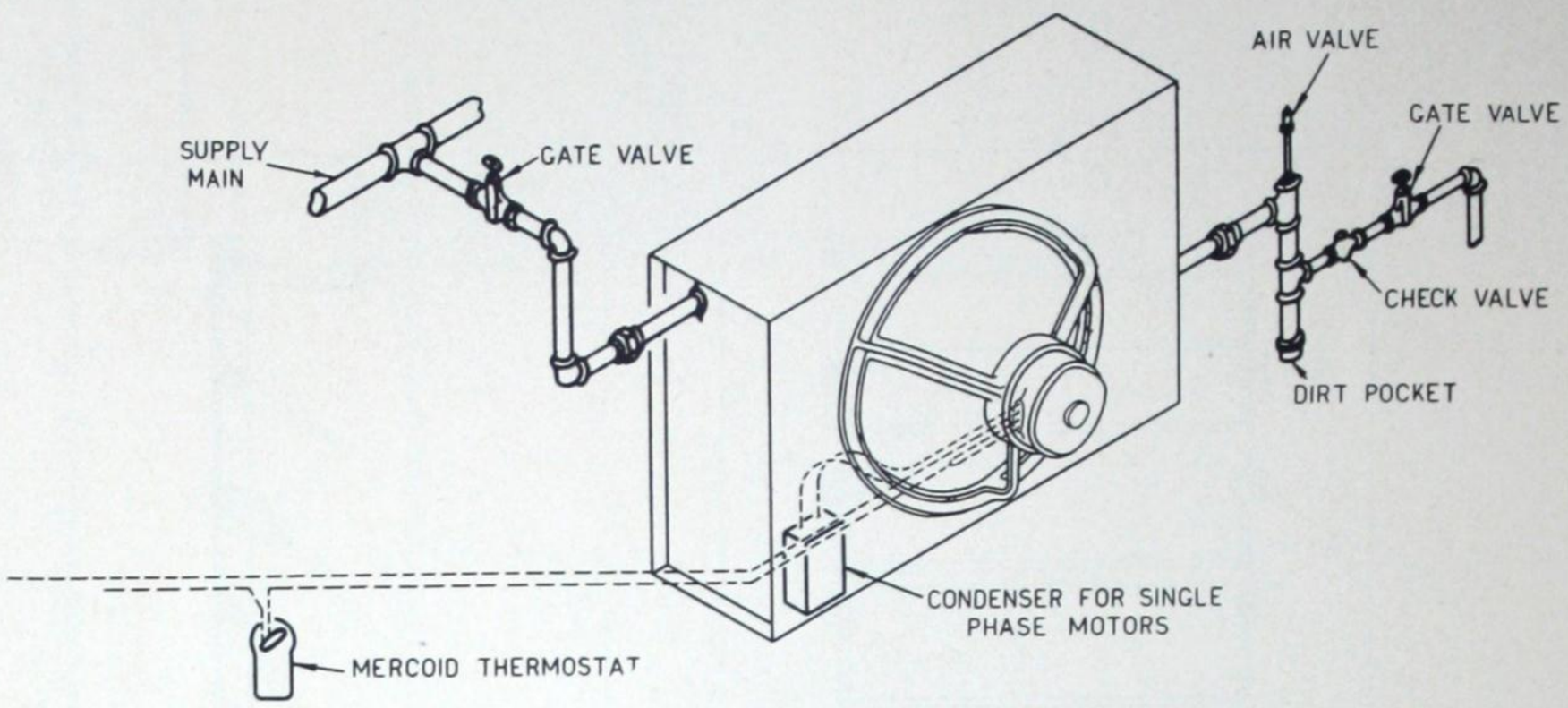
SPECIFICATIONS

Side plates are integral with heater, of 16 gage steel.

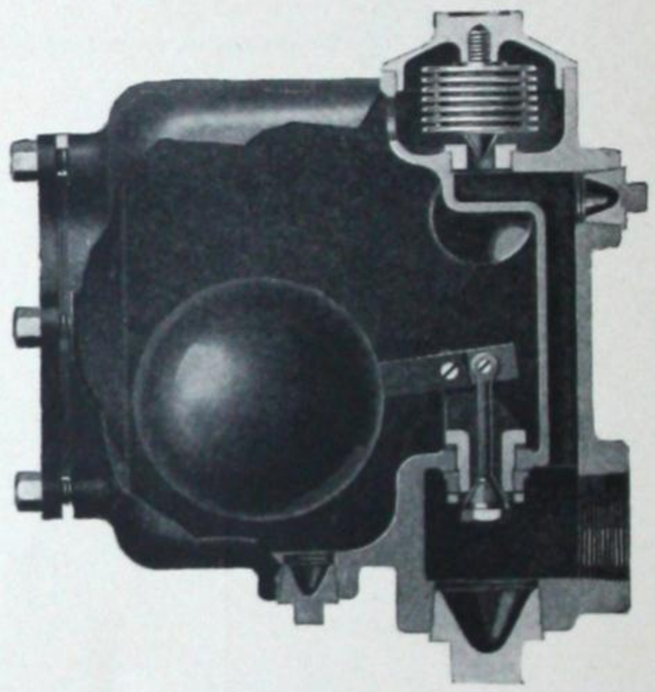
Deflector vanes are adjustable and removable of 20 gage steel.

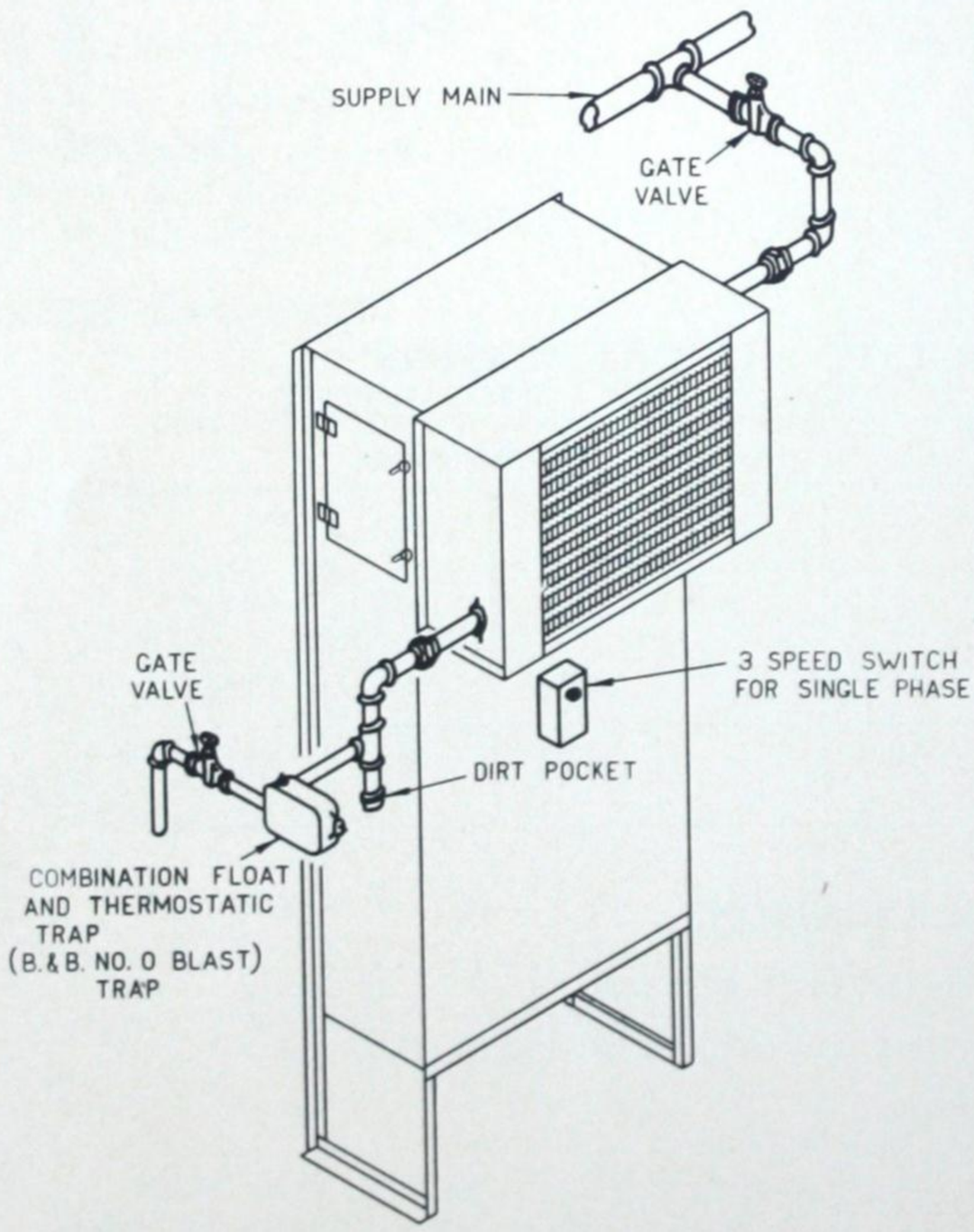
Finish matches that of unit heater.

TYPICAL PIPING AND ELECTRICAL CONNECTIONS FOR MASSACHUSETTS TYPE "H" UNIT HEATERS



TYPE "H" UNIT HEATER SUSPENDED FROM CEILING



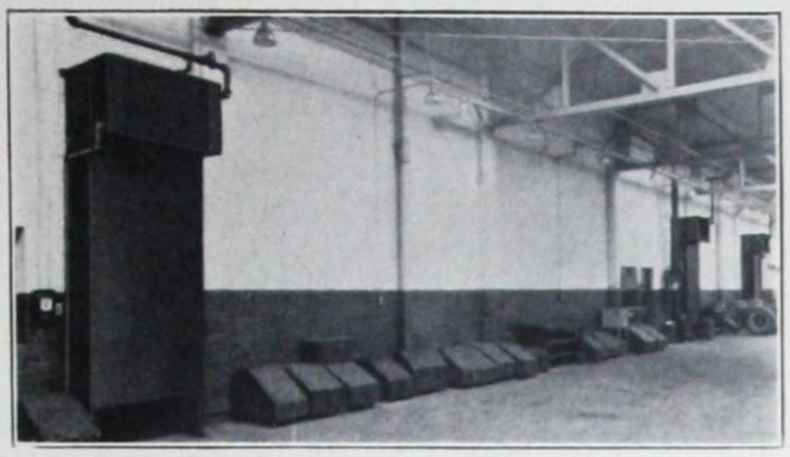


TYPE "H" UNIT HEATER WITH RECIRCULATING BOX

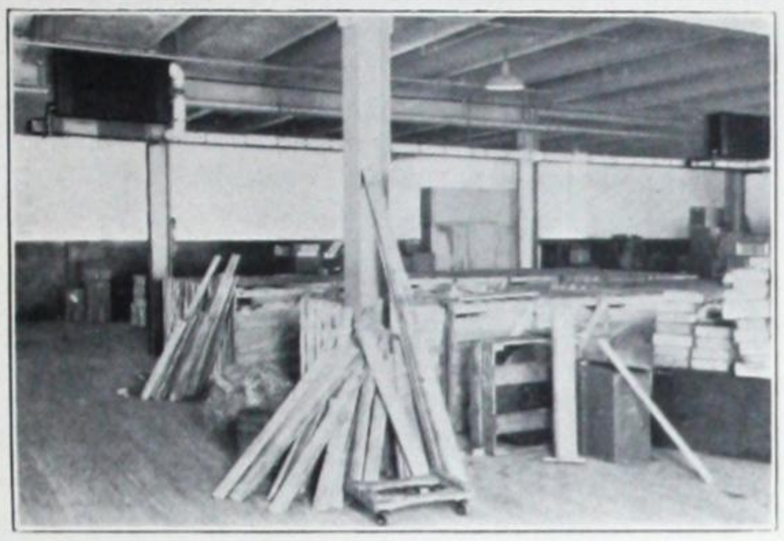
Because of the decrease in efficiency in thermostatic traps operated over a wide range of discharge temperatures encountered in connection with the varying steam pressures used for unit heaters, the No. 0 Blast Trap has been designed as a combination thermostatic and float trap to meet widely varying conditions without loss of efficiency.

The No. 0 Blast Trap maintains a continuous flow of condensate from the unit, regardless of temperature of condensate, and quickly evacuates the water of condensation under all conditions, eliminating entirely the possibility of freezing.

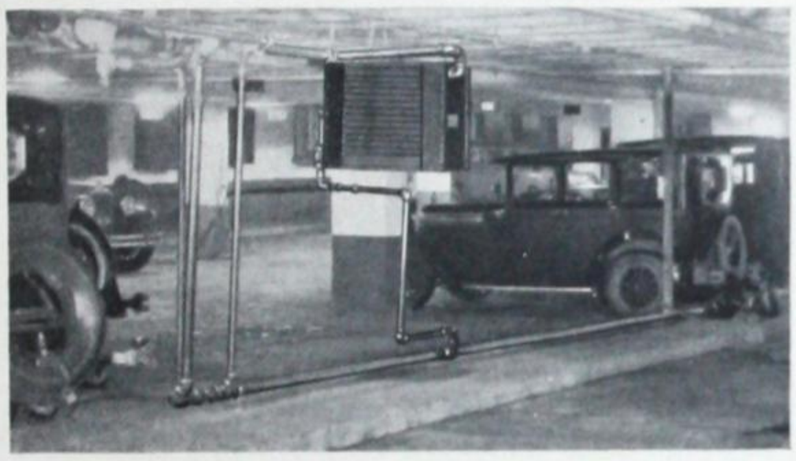
The No. 0 Blast Trap is designed primarily for unit heaters, being fitted with a Thermostatic member for the relief of air and a large area port opening controlled by a ball float for the evacuation of condensation.



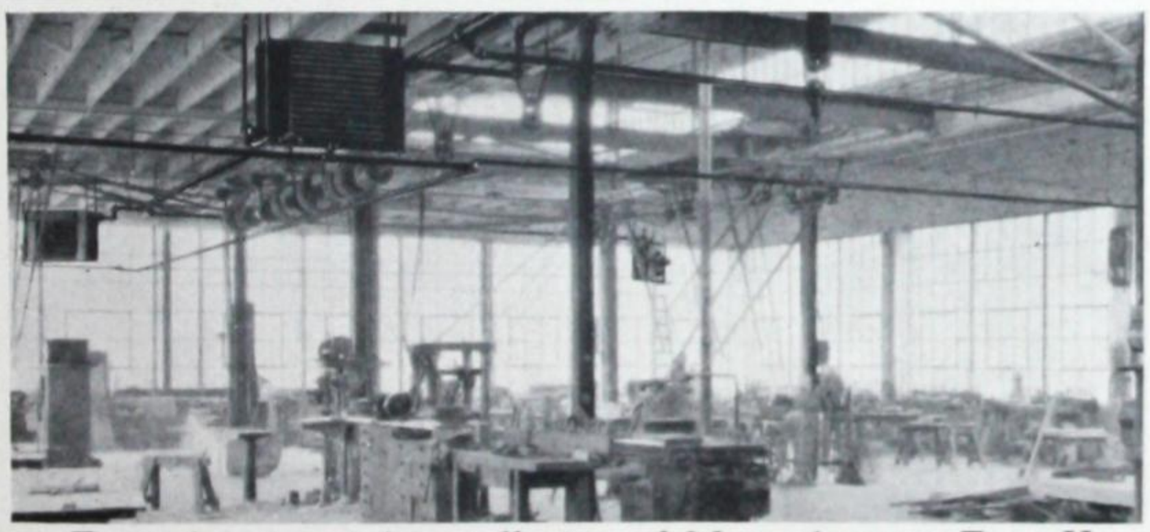
Left: Typical installation of Massachusetts Type H Unit Heaters fitted with recirculating boxes for garage heating



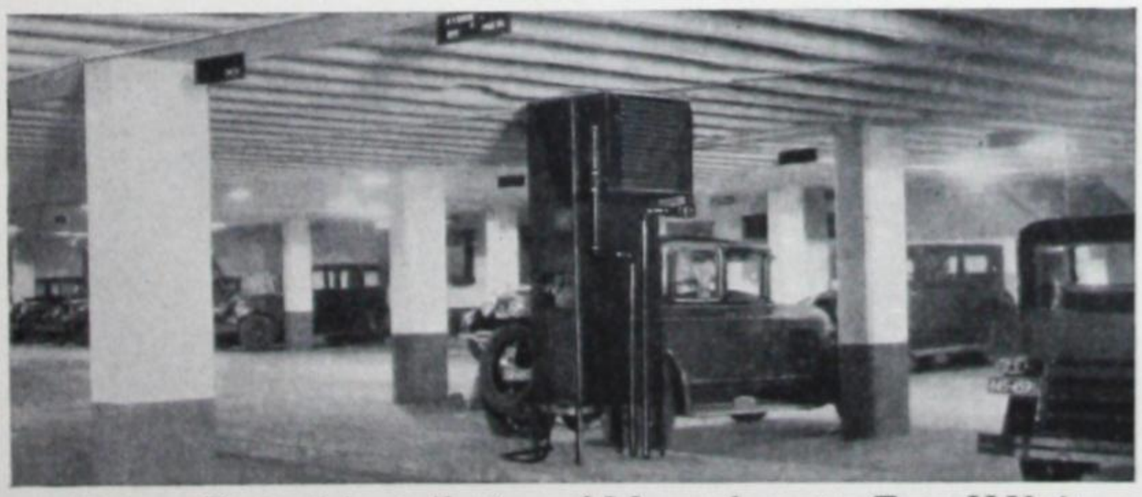
Left: Massachusetts Type H Unit Heaters ceiling suspended type for warehouse heating.



Left: Typical installation of Massachusetts Type H Unit Heater, ceiling suspended type for garage heating.



Typical industrial installation of Massachusetts Type H Unit Heater



Above: Typical installation of Massachusetts Type H Unit Heaters fitted with recirculating boxes for garage heating.

A Few Representative Installations of Massachusetts Unit Heaters

Manufacturing Plants

The Brost Pattern Works — Cleveland, O.
The Beaver Mfg. Co. — Ballardville, Mass.
Cox Refrigerating Engineering Co. — Indianapolis, Ind.
Long Bell Lumber Co. — Oklahoma City, Okla.
Oklahoma Manufacturing Co. — Oklahoma City, Okla.
Franklin County Lumber Co. — Greenfield, Mass.
Bridgeport Chair Co. — Bridgeport, Conn.
Bullard Machine Tool Co. — Bridgeport, Conn.
Meyer Body Co. — Buffalo, N. Y.
Ladish Drop Forge Co. — Cudahy, Wis.
The Shelby Cycle Co. — Shelby, Ohio
W. E. Asplin Basket Co. — Chardon, Ohio
Thomas L. Gatke Co. — Winona Lake, Ind.
The Toy Kraft Co. — Wooster, Ohio
N. Klausner & Sons Co. — Cleveland, Ohio
Cummins Canning Co. — Conneaut, Ohio
Massachusetts Electric Mfg. Co. — West Lynn, Mass.
F. C. Hersee Mfg. Co. — Watertown, Mass.
George Weston Biscuit Co. — Watertown, Mass.
Hardie Manufacturing Co. — Hudson, Mich.
General Industries Co. — Elyria, Ohio
The Crew Levick Co. — Philadelphia, Pa.
The Brown Company "Berlin Mills" — Berlin, New Hampshire
The Liquid Carbonic Co. — Cleveland, Ohio
The Liquid Carbonic Co. — St. Louis, Mo.
The Pittsburgh Plate Glass Co. — Crystal City, Mo.
Forest Furniture Co. — N. Wilkesboro, N. C.
Chesapeake & Ohio Railway Co. Shops — Russell, Kentucky
The Bender Body Co. — Cleveland, Ohio
Pemberton Power Co. — Boston, Mass.
Dodge Steel Co. — Philadelphia, Pa.
Alemite Lubricating Co. — Baltimore, Md.
Bellanca Air Craft Corp. — Newcastle, Del.
Central Alloy Steel Co — Canton, Ohio
Cleveland Electric Illuminating Co. — Ashtabula, Ohio

Garages, Service Stations and Auto Sales Rooms:

The Mittleman Garage — Chicago, Ill.
The Cleveland Clinic Garage — Cleveland, O.
The Stanton Garage "Ford" — Euclid, Ohio
West Towns R. R. Bus Garage — Chicago
The White Motor Co. — Detroit, Mich.
Main Street Garage Co. — Waltham, Mass.
Morrisey Motor Car Co. — Bridgeport, Conn.
The Davison Cartage Co. — Chicago, Ill.
Woodland Cemetery Garage — Detroit, Mich.
Chevrolet Garage — Rochester, Mich.
The White Motor Co. — Columbus, Ohio
G. A. Mighton Realty Co. — Shaker Hts, O.
Consolidated Cartage Co. — Cleveland, Ohio
Richard Lydy Garage — Chicago, Ill.

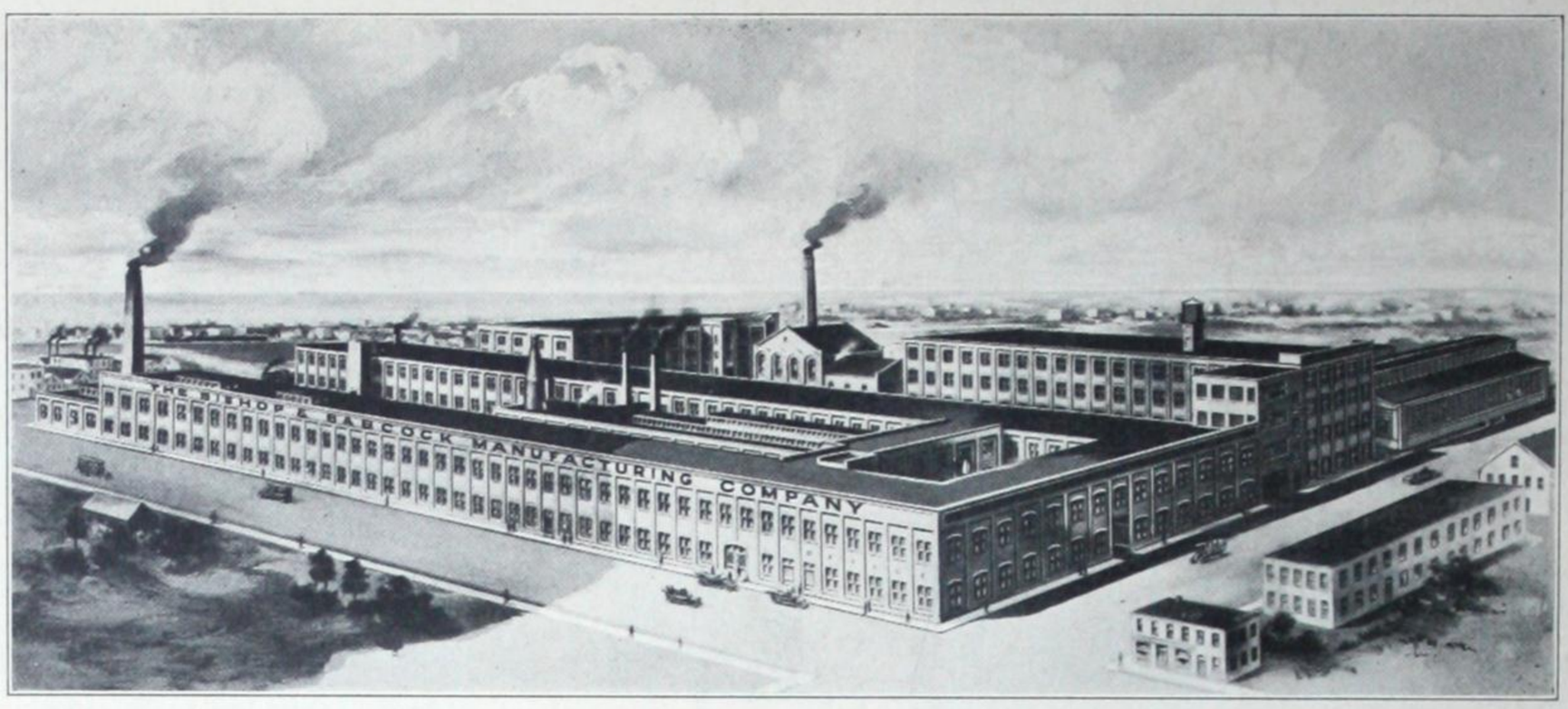
Public Buildings:

The Oklahoma State Penitentiary — McAlister, Okla.
The Albert Pike Hotel — Little Rock, Ark.
American College of Surgeons — Chicago, Ill.
Library Bldg. Oklahoma State University — Norman, Okla.
Great Neck High School — Great Neck, L. I., N. Y.
Girls' Dormitory — Wilburton, Okla.
Administration Bldg. — Wilburton, Okla.
McDonogh School — Baltimore, Md.
Bethany English Lutheran Church — Cleveland, Ohio

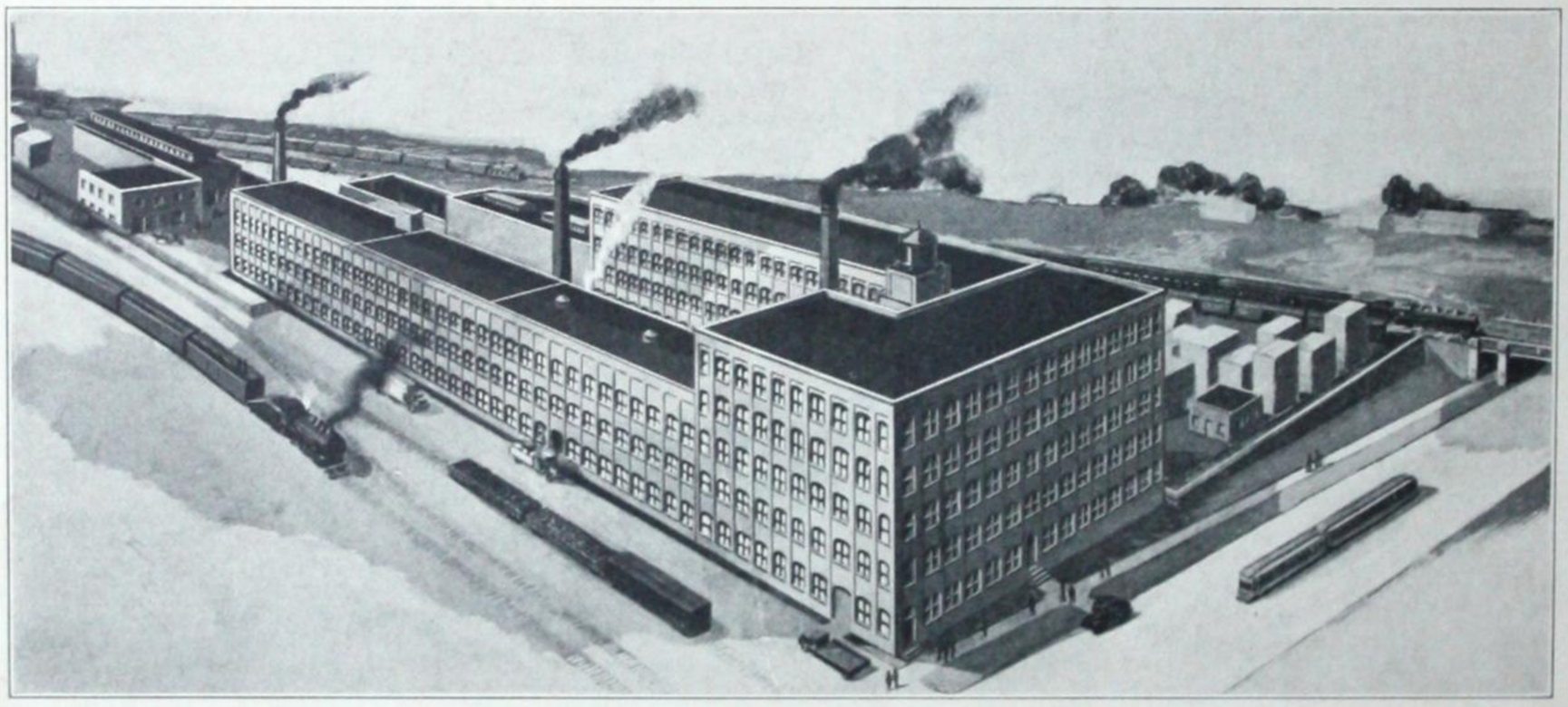
Miscellaneous Applications:

Maggenti & Dougherty Co. — Philadelphia
Samuel Stelke — Stamford, Conn.
L. J. Fitzpatrick — Southampton, Pa.
Lord, Hawley & Hammell — Philadelphia
Chas. A. Thomas — Berlin, N. J.
Sol. H. Goldberg — Chicago, Ill.
A. H. Riviere Co. — Summit, N. J.
Rickley Brothers — Philadelphia, Pa.
Kallish & Scull Co. — Philadelphia, Pa.
Joseph Kettman Co. — Bridgeport, Conn.
Stephenson Contracting Co. — Atlanta, Ga.
Max Klunman — Baltimore, Md.
R. T. Pender, Inc. — Lynn, Mass.
J. B. Kennedy Co. — Greenfield, Mass.
Krane Engineering Co. — Chicago, Ill.
Brooklyn Plumbing Co. — Waterbury, Conn.
Morris Winnikoff Co. — Waterbury, Conn.
E. J. Claffy — Chicago, Ill.
Ben Kahn & Co. — Cleveland, Ohio

MASSACHUSETTS



No. 1 PLANT
4901-4915 HAMILTON AVE., N. E.



No. 2 PLANT
1194-1204 EAST 55th STREET, N. E.

Factories of
The Bishop & Babcock Mfg. Co.
Cleveland, Ohio

MANUFACTURERS OF

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Radiator Supply Valves
Low Pressure Steam Specialties
Temperature Regulation Apparatus
Seamless Multiflex Metal Bellows
Humidity Regulation Apparatus
Miscellaneous Ventilating Equipment
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